

Application No.: 10/826,893

Case No.: 56847US007

Amendments to the Claims:

The following Listing of Claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-16. (Canceled)

17. (Currently Amended) A hydroformable ~~article~~ frame comprising:

a female tube portion and a male tube portion, a portion of said female tube portion being disposed about a portion of said male tube portion;

a groove disposed in at least one of said male tube portion and said female tube portion to form an annular region between said male tube portion and said female tube portion; and

a cured adhesive disposed in said annular region between said male tube portion and said female tube portion so as to form a bonded joint,

wherein said bonded joint is able to withstand ~~a~~ the hydroforming process of said frame into a final form substantially without leakage and maintain sufficient strength, fatigue resistance and durability to be utilized as ~~a~~ within said structural frame element after said article is formed into its final shape.

18. (Canceled) -

19. (Currently Amended) The hydroformable ~~article~~ frame according to claim 17, wherein said frame is ~~article forms part of a structural frame member of~~ a vehicle frame.

20-21. (Canceled)

22. (Currently Amended) The hydroformable ~~article~~ frame according to claim 17, wherein said adhesive has a minimum shear yield strength of at least about 5000 psi.

23. (Currently Amended) The hydroformable ~~article~~ frame according to claim 17, wherein said male tube portion and said female tube portion are each made of a metal that has a minimum yield strength of at least about 30,000 psi.

Application No.: 10/826,893

Case No.: 56847US007

24. (Currently Amended) The hydroformable ~~article~~ frame according to claim 17, wherein said adhesive exhibits a shear yield stress that is at least equal to the hydroforming pressure of the hydroforming process.

25. (Currently Amended) A hydroformed ~~article~~ frame comprising:
a female tube portion and a male tube portion, a portion of said female tube portion being disposed about a portion of said male tube portion so as to form a joint;
a groove disposed in at least one of said male tube portion and said female tube portion to form an annular region between said male tube portion and said female tube portion; and
a cured adhesive disposed in said annular region between said male tube portion and said female tube portion,
wherein said frame, including said female tube portion and said male tube portion, having been permanently deformed by hydroforming so as to be reshaped into a different form.

26. (Currently Amended) The hydroformed ~~article~~ frame according to claim 25, wherein said female tube portion includes a remainder portion outside of said joint, said male tube portion includes a remainder portion outside of said joint, and the remainder portion of said male tube portion being disposed at an angle of ~~greater than or less than 180 degrees~~ to the remainder portion of said female tube portion.

27. (Currently Amended) The hydroformed ~~article~~ frame according to claim 26, wherein the remainder portion of said female tube portion and the remainder portion of said male tube portion form one of an L-shape, T-shape, S-shape and a cross-shape.

28. (Currently Amended) The hydroformed ~~article~~ frame according to claim 25, wherein said groove is formed in said male tube portion, and said female tube portion does not contain a groove.

Application No.: 10/826,893

Case No.: 56847US007

29. (Currently Amended) ~~A composite frame structure comprising a plurality of said hydroformable article~~ The hydroformable frame according to claim 17 being in the form of a birdcage structure, said birdcage structure being hydroformable into a desired final shape.

30. (Currently Amended) The hydroformed ~~article~~ frame according to claim 25, wherein said cured adhesive, as well as said female tube portion and said male tube portion, has been permanently deformed by hydroforming.

31. (Currently Amended) The hydroformed ~~article~~ frame according to claim 25, wherein said cured adhesive is disposed in said annular region so as to bond together said male tube portion and said female tube portion ~~and so as to prevent substantial leakage during the hydroforming to form a bonded joint capable of withstanding the hydroforming of said frame into a final form substantially without leakage and maintain sufficient strength, fatigue resistance and durability to be utilized within said frame.~~

32. (Canceled)

33. (Currently Amended) The hydroformed ~~article~~ frame according to claim 25, wherein said groove is formed in said female tube portion, another groove is formed in said male tube portion, and the two grooves are positioned so as to be offset with respect to each other.

34. (Currently Amended) The hydroformed ~~article~~ frame according to claim 25, wherein said ¹groove is formed in said male tube portion and another groove is formed in said female tube portion, so that together the two grooves form said annular region.

35. (Currently Amended) The hydroformed ~~article~~ frame according to claim 25, wherein said groove has a groove depth, said male tube portion and said female tube portion have a fit-up clearance, and the ratio of the groove depth to fit-up clearance is sufficient to prevent bypass leakage of said adhesive beyond said joint, when said adhesive in an uncured state is disposed in said annular region.

Application No.: 10/826,893

Case No.: 56847US007

36. (Currently Amended) ~~A composite birdcage frame structure comprising a plurality of said hydroformed article~~ The hydroformed frame according to claim 25, said being a birdcage structure having been hydroformed into a desired final shape.

37. (New) The hydroformable frame according to claim 17, further comprising an inlet hole formed in said female tube portion in communication with said annular region through which said adhesive is introduced into said region.

38. (New) The hydroformable frame according to claim 37, further comprising an exit hole formed in said female tube portion in communication with said annular region to facilitate the introduction of said adhesive into said annular region

39. (New) The hydroformed frame according to claim 25, further comprising an inlet hole formed in said female tube portion in communication with said annular region through which an adhesive is introduced into said region.

40. (New) The hydroformed frame according to claim 39, further comprising an exit hole formed in said female tube portion in communication with said annular region to facilitate the introduction of said adhesive into said annular region.

41. (New) The hydroformed frame according to claim 25, wherein said male tube portion and said female tube portion are each made of steel having a yield strength in the range of from about 30 kpsi to about 50 kpsi.

42. (New) The hydroformed frame according to claim 25, wherein said male tube portion and said female tube portion are each made of steel having a yield strength of at least 50 kpsi.